Journal of Physics: Conference Series 2017 vol.791 N1

High-dose boron and silver ion implantation into PMMA probed by slow positrons: Effects of carbonization and formation of metal nanoparticles

Kavetskyy T., Iida K., Nagashima Y., Kuczumow A., Šauša O., Nuzhdin V., Valeev V., Stepanov A.
Kazan Federal University, 420008, Kremlevskaya 18, Kazan, Russia

Abstract

© Published under licence by IOP Publishing Ltd. The Doppler broadening slow positron beam spectroscopy (SPBS) data for the previously observed effect of carbonization in high-dose (> 10 16 ion/cm 2) 40 keV boron-ion-implanted polymethylmethacrylate (B:PMMA) and another one obtained for the effect of formation of metal nanoparticles in high-dose 30 keV silver-io--implanted polymer (Ag:PMMA) are compared. Following to the Doppler broadening SPBS results, a difference in the high-dose ion-irradiation-induced processes in B:PMMA and Ag:PMMA is detected.

http://dx.doi.org/10.1088/1742-6596/791/1/012028

References

[1] Sviridov D V 2002 Russ. Chem. Rev. 71 315
[2] Stepanov A L 2004 Tech. Phys. 49 143
[3] Wasserman B, Braunstein G, Dresselhaus M S and Wnek G E 1983 Mater. Res. Soc. Symp. Proc. 27 423
[4] Lee E H, Rao G R and Mansur L K 1992 J. Mater. Res. 7 1900
[5] Bridwell L B 1992 Solid State Phenomena 27 163
[6] Lee E H, Rao G R, Lewis M B and Mansur L K 1993 Nucl. Instr. Meth. Phys Res. B 74 326
[7] Rao G R, Lee E H and Mansur L K 1993 Wear 162-164 739
[8] Kavetskyy T, Tsmots V, Kinomura A, Kobayashi Y, Suzuki R, Mohamed H F M, Šauša O, Nuzhdin V, Valeev V and Stepanov A L 2014 J. Phys. Chem. B 118 4194
[9] Kavetskyy T, Nowak J, Borc J, Rusnák J, Šauša O and Stepanov A L 2016 Spectr. Lett. 49 5
[10] Kavetskyy T, Tsmots V, Nowak J, Kuczumow A, Kinomura A, Kobayashi Y, Suzuki R, Mohamed H F M, Šauša O, Nuzhdin V, Valeev V and Stepanov A L 2016 Mater. Sci. Forum (Proc. "ICPA-17 IC Positron Annihilation 2015") in press
[11] Stepanov A L, Abdullin S N, Petukhov V Yu, Osin Yu N, Khaibullin R I and Khaibullin I B 2000 Phil. Mag. B 80 23
[12] Stepanov A L 2010 Rev. Adv. Mater. Sci. 26 1
[13] Maier S A, Kik P G, Sweatlock L A, Atwater H A, Penninkhof J J, Polman A, Meltzer S, Harel E, Requicha A A G and Koel B E 2003 Mater. Res. Soc. Symp. Proc. 777 T7.1.1
[14] Boldyryeva H, Kishimoto N, Umeda N, Kono K, Plaksin O A and Takeda Y 2004 Nucl. Instr. Meth. Phys. Res. B 219-220 953
[15] Boldyryeva H, Umeda N, Plaksin O A, Takeda Y and Kishimoto N 2005 Surf. Coat. Technol. 196 373
[16] Galyautdinov M F, Nuzhdin V I, Fattakhov Ya V, Farrakhov B F, Valeev V F, Osin Yu N and Stepanov A L 2016 Tech. Phys. Lett. 42 182
[17] Nagashima Y, Hakodate T, Miyamoto A, Michishio K and Terabe H 2009 J. Phys.: Conf. Ser. 194 012039

[18] Saito F, Yotoriyama T, Nagashima Y, Suzuki Y, Itoh Y, Goto A, Iwaki M, Nishiyama I and Hyodo T 2004 Mater. Sci. Forum 445-446 340

[19] Saito F, Yotoriyama T, Nishiyama I, Suzuki Y, Goto A, Nagashima Y and Hyodo T 2014 Phys. Chem. Chem. Phys. 16 26991

[20] Stepanov A L, Nuzhdin V I, Valeev V F, Galyautdinov M F, Nuzhdin E V, Safina I R and Kavetskyy T S 2015 Intern. J. Appl. Fund. Res. 8 676